Remarks – General

1. The Objections to the Drawings under 27 CFR 1.83(a)

By the above amendment, Applicants have amended the **drawings** (Figs 1A, 1B, 1C, and 2A) to show the voltage supply, see attached drawings.

Applicants have rewritten all claims to define the invention more particularly and distinctly so as to overcome the technical objections and rejections, and define the invention patentably over the prior art.

2. The Objections to the Claims Due to Informalities (Claims 10 and 25)

The claims were objected to because of informalities. Applicants have removed the informalities as prescribed by The Examiner.

- amended Claim 10 replacing the phrase "and shape. Ions" with the phrase "and shape, ions".
- amended Claim 25 replacing the phrase "said electric field" with "said electrostatic fields".

In addition, Claims 3, 12, 13, 14, 18, and 25 have been amended to keep consistency of the terminology by replacing "electric field" with "electrostatic field".

3. The Rejection of Claims 1-26 under 35 USC § 112

Claims 1-26 were rejected under 35 USC 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Independent Claim 1 was rewritten as follows:

- removing the phrase "and/or" and replaced it with "or" removing the rejection that the claim as unascertainable.
- adding the phrase "high transmission" before the word surface at lines 5-6, 8-12, and 20-21 removing the ambiguity of whether surface referred to the "target surface" or the "conductive high transmission surface"; as pointed out by The Examiner.

Dependent Claim 3 was rewritten as follows:

- adding the phrase "high transmission" before the word surface at lines 3-4 removing the ambiguity of whether surface referred to the "target surface" or the "conductive high

transmission surface".

Dependent Claim 8 was rewritten to remove the rejection that the claim is indefinite because it is unclear whether the limitations following the phrase "such as" are part of the claimed invention:

- the phrase "sources, such as, electrospray, atmospheric pressure chemical ionization, atmospheric laser desorption, photoionization, discharge ionization, inductively coupled plasma ionization" was deleted and replace with the phrase "; electrospray, atmospheric pressure chemical ionization, laser desorption, photoionization, or discharge ionization sources; or inductively coupled plasma ionization source or a combination thereof."

Dependent Claim 11 was rewritten as follows:

- the phrase "in such a way" was deleted as suggested by The Examiner such that the limitation is positively recited.

- adding the phrase "high transmission" before the word surface at line 5 and 6 removing the ambiguity of whether surface referred to the "target surface" or the "conductive high transmission surface".

Independent Claim 13 was rewritten as follows:

- adding the phrase "high transmission" before the word surface at line 16 removing the ambiguity of whether surface referred to the "target surface" or the "conductive high transmission surface".

Dependent Claim 14 was rewritten as follows:

- adding the phrase "high transmission" before the word surface at line 3 removing the ambiguity of whether surface referred to the "target surface" or the "conductive high transmission surface".

Dependent Claim 15 was rewritten to remove the rejection that the claim is indefinite because it is unclear whether the limitations following the phrase "such as" are part of the claimed invention:

the phrase "sources, such as, electrospray, discharge ionization, electron capture ionization, inductively charging" was deleted and replaced with the phrase "; electrospray, atmospheric

inductive charging, discharge, or electron capture ionization, or combination thereof."

Independent Claim 18 was rewritten as follows:

- removing the phrase "and/or" and replaced it with "or", line 2, removing the rejection that the claim as unascertainable.

- adding the phrase "high transmission" before the word surface at lines 6-7, 9, 10, and 20 removing the ambiguity of whether surface referred to the "target surface" or the "conductive high transmission surface". In addition, to distinguish our "high transmission surface" from the high transmission surface described by Jarrell et al. (5,306,910) and Kato et al. (5,801,081) the word "perforated" was added before high transmission surface.

Dependent Claim 19 was rewritten to remove the rejection that the claim is indefinite because it is unclear whether the limitations following the phrase "such as" are part of the claimed invention:

- the phrase "an analytical system such as" at line 5 was deleted and "or a combination thereof" was added at line 6.

Dependent Claim 26 was rewritten as follows:

- the phrase "in such a way" was deleted as suggested by The Examiner such that the limitation is positively recited.

Claims 1, 3, 8, 11, 13-15, 18, 19, and 26.

By removing the objection of the independent claims **1, 13** and **18**; and dependent claims **3, 8, 11, 14, 15, 19,** and **26** being indefinite; the claims comply with § 112 and therefore request the withdrawal of this rejection.

Thus the present claims clearly point out and distinctly claim the subject matter in the invention. Accordingly applicants submit that the claims do comply with § 112 and therefore request withdrawal of the rejections.

The Rejection of Independent Claim 1 on Jarrell et al. (U.S. 5,306,910) in View of Labowsky et al. (U.S. 4,531,056) due to Obvious Is Overcome

Claim 1 has been rewritten to include the remarks from the Office Action and substance of our interview (held June 24, 2003 with The Examiner) as currently amended claim 1 to define patentably over these references, and any combination thereof. Applicants request reconsideration of this rejection, as now applicable to currently amended claim 1, for the following reasons:

(1) There is no justification, in Jarrell et al. in view of Labowsky et al., or in any prior art separate from applicant's disclosure, which suggests that the use of a **perforated high transmission surface** at atmospheric pressure be used to isolate the source of atmospheric or near atmospheric ion generation from the region of ion focusing; and the transfer of gas-phase ions from this highly dispersive ion source across this perforated surface into the ion focusing and collection regions by means of **maintaining a the downstream side of the surface at a greater electrostatic potential than the upstream side of the surface**. In fact, the scientist at the time did not appreciate the shape and magnitude of the electrostatic field lines to focus ions at atmospheric pressure. Their point of view had a basis in the principles of focusing ions at reduced pressures [a vacuum].

(2) The use of the term "high transmission surface" in both Jarrell et al. and claim 1 of Applicants' device may have led to rejection of claim 1 due to the usage of the same terminology for different structures and used in different manner.

(3) The use of the term "at or near atmospheric pressure" in the Applicant's device objected to during the interview.

(4) The target aperture in Jarrell et al. resides in a lower pressure region, while Applicants' target is in a region adjacent to the high transmission surface at or near atmospheric pressure.

(5) This novel physical feature of Claim 1 produce new, unexpected results and advantages, and hence are unobvious and patentable over these references.

The References and Differences of the Present Invention Thereover

Prior to discussing the claims and the above 5 points, applicants will first discuss the references and the general novelty of the present invention and its unobviousness over the references.

Jarrell et al.'s apparatus includes a grid (50) whose electrical potential is oscillatory, swinging from a negative to a slightly positive potential. Upstream of the grid is a capillary needle with liquid flowing out of. Upon reaching the negative potential a charged droplet is drawn out of the capillary and attracted to the grid. Due to the **momentum** of the charged droplets they pass through the openings of the grid into a region between the grid (50) and a high transmission surface (30). When the potential of the grid becomes positive the charged droplets, and any ions resulting from the breakup of the droplets, are directed toward a conductive high transmission surface (30) having hole (33) through which ions pass unobstructed on the way to a collector target or aperture (19) in a lower pressure region. Their **high transmission surface being at an interface—atmospheric pressure and a lower pressure region** while **the target is in a lower pressure region**.

Thus Jarrell et al.'s procedure is an **ionization source** allowing the production of charged droplets with the electrospray needle and high transmission surface being at or near ground potential. The ion source being established between the grid and the high transmission surface. Therefore Jarrell et al's procedure of charged droplet production doses not allow for the separation of ion production and ion focusing, they are performing both procedures in the same region and at the same time. Even through their grid allows the passage of charged droplets, the vast majority of droplets would collide with the grid itself before passing through the grid due to the low electrical potential ratio across the grid. Further, their high transmission surface has a **single conductive aperture into a lower pressure region**, while the Applicant's high transmission surface is very distinct from Jarrell et al.'s device in that the Applicant's structure is made up of a surface with a plurality of holes separating two regions at approximately the same pressure—atmospheric pressure.

Labowsky et al.'s apparatus includes a perforated diaphragm serving as a **gas flow controller**, having a plurality of holes, with the largest hole at it center, serving to direct the gas flow counter to the liquid flow from the capillary outlet to sweep solvent vapors away from the aperture (4) and also to aid in the evaporation of the droplets and the production of gas-phase ions downstream of the diaphragm so that only desolvated gas-phase ions are sampled by the aperture (4). In addition, it serves as a focusing electrode stabilizing the position of the electrospray needle allowing the **liquid jet emanating from the capillary outlet to pass thr ugh** the central hole whereby the liquid jet [not a dispersive source but a discrete object with a reduced cross section] breaks up into highly charged droplets forming a dispersive aerosol of charged droplets on the downstream side of the perforated diaphragm. Thus

Labowsky et al.'s procedure of ion formation is to desolvate ions downstream of the perforated diaphragm very close to the aperture, before the introducing of ions into low pressure regions where the ions can be reaccelerated and focused without significant loss of due to energy spread, overcoming the energy spread of clustered ions at reduced pressures but not the transmission of ions into the lower pressure region (col. 4, paragraph 2). Further, Labowsky et al's procedure of ion production and ion sampling, is **closely coupled** and does not enable ion production to be separated from ion focusing at atmospheric pressure.

The Use of the Term "High Transmission Surface" in Jarrell et al. and the Applicants Device Results in Confusing Terminology

Jarrell et al.'s high transmission surface **separates two distinct pressure regions**, atmospheric pressure and a lower pressure region, while the Applicants' thigh transmission surface is at atmospheric pressure. The entire device, ion source, high transmission surface, and target surface are all at atmospheric pressure. Therefore, Applicant's high transmission surface is distinct from Jarrell et al.'s.

The Use of the Term "At or Near Atmospheric Pressure" in Applicants' Device Results in Indefinite Terminology

All electrospray and atmospheric pressure ionization ion sources today are operated at either the pressure surrounding the analytical instrument [atmospheric pressure for that local], slightly above atmospheric pressure (10-100 mm Hg above the atmospheric pressure for that local), or slightly below atmospheric pressure (10-100 mm Hg below the atmospheric pressure for that local). By pressurizing the source, gaseous components outside the source are prevented from diffusing into the source. These external components [both ionized and unionized] can lead to contamination of the source thereby making the ion source non-operational or operational at a reduced performance, can suppress the ionization of the components of interest, or result in chemical noise leading to a suppression of the recorded signal by the analytical instrument.

By using a vacuum pump the ion source can be maintained at pressures slightly below atmospheric pressure. This is a common practice to prevent components inside the ion source from diffusing out into the atmosphere surrounding the instrument and possible contact with the personal operating the instrument, and also to reduce the large gas load on the atmospheric interface that some pneumatically

assisted atmospheric ionizations source are required to operate efficiently, such as atmospheric pressure chemical ionization sources. For these reasons the term "at or near atmospheric pressure" was used to **encompass all the operating conditions** of atmospheric ionization sources.

Jarrell et al.'s Target Aperture Resides in a Lower Pressure Region

See above. Jarrell et al.'s target aperture is in a lower pressure region while the Applicant's target aperture is at atmospheric pressure. Therefore, Applicants' target surface is distinct from Jarrell et al's.

The Novel Physical Features of Currently Amended Independent Claim 1 Produce New and Unexpected Results and Hence are Unobvious and Patentable Over These References Under § 103.

Also applicants submit that the novel physical features of a perforated high transmission surface are also unobvious and hence patentable under § 103 since they produce new and unexpected results over Jarrell et al. in view of Labosky et al., or any combination thereof.

These new and unexpected results are the ability of applicants' system to **sample a highly dispersive source of gas-phase ions** or clusters ions from various types atmospheric pressure ion sources and **focus** the aerosol of ions onto a reduced cross-sectional area, by interposing a **thin perforated high transmission surface**, populated with a plurality of holes, between the ion source and the ion destination [or target] and establishing a **large electrostatic potential difference, a ratio greater than one, across the surface**—all at **atmospheric pressure**. This in turns results in substantially all gas-phase ions on one side of the perforated high transmission surface being transferred across the surface, without colliding with the surface itself, and being focused onto a reduced cross-sectional area at the target surface. Applicants' system is therefore vastly superior to Jarrell et al. and Labowsky et al., or any possible combination thereof for **separating or isolating the processes of ion production from the sequent focusing of ions, transferring substantially all of the ions across the surface, without colliding with the surface,** and **delivering the ions** onto a target or aperture as a reduced cross-sectional area. The novel features of Applicants' system which effect these differences are, as stated, clearly recited in claim 1.

Jarrell et al. and Labowsky et al. Do Contain Justification To Supp rt Their Combinati n To Persons Having Ordinary Skills In The Art

With regard to the proposed combination of Jarrell et al. and Labowsky et al., the Applicants agree with The Examiner's proposal that doing so "would have been to maximize the generation of ions of the electrospray source as indicated by Labowsky et al. at col. 7, lines 5-19", creating an ion source.

The use of a high transmission surface as described by the Applicants in Claim 1 is not to maximize the generation of ions, but to allow the production of gas-phase ions to take place distally to the high transmission surface, attract these gas-phase ions to the surface, passage of the ions through the plurality of openings in the surface by means of a large electrostatic ratio across the surface with the electrostatic potential at the underside of the high transmission being larger than the electrostatic potential at the topside. Once through the openings the ions are focused onto a target or into an aperture—all at atmospheric pressure.

Applicants therefore submits that combining Jarrell et al. and Labowsky et al. is justified but while both apparatus's are for **gas-phase ion production,** the applicants apparatus is for the **separation** of the regions of **ion production** from the subsequent **focusing** of the ions utilizing a perforated high transmission surface, irregardless how the ions are formed at or near atmospheric pressure. In addition, by maintaining a large electrostatic potential across the perforated surface **substantially all** the ions in the ion source are transferred across the perforated surface, without colliding with the surface into the focusing region.

The Dependent Claims 2-6 and 8-13 are A Fortiori Patentable Over Jarrell et al. in View of Labowsky et al.

Amended dependent claims 2-6 and 8-13 incorporate all the subject matter of amended independent claim 1 and add additional subject matter which makes them a fortiori and independently patentable overt these references.

The Dependent Claim 7 Has Been Withdrawn

Dependent claim 7 has been withdrawn. The subject matter is incorporated in amended dependent claim 6 by adding the phrase "or ion mobility spectrometer or combination thereof" to line 2.

New Dependent Claim 27 Has Been Added

New dependent claim 27 cites that the electrostatic field ratio across the high transmission surface be greater than 1 to 1, with the downstream side having the larger magnitude.

The Rejection of Independent Claim 13 on Jarrell et al. (U.S. 5,306,910) in View of Labowsky et al. (U.S. 4,531,056) due to Obvious Is Overcome

Claim 13 has been rewritten to define patentably over these references, and any combination thereof. Applicants request reconsideration of this rejection, as now applicable to currently amended claim 13, for the same reasons as above for claim 1.

The Dependent Claims 14-17 are A Fortiori Patentable Over Jarrell et al. in View of Labowsky et al.

Amended dependent claims 14-17 incorporate all the subject matter of amended independent claim 13 which makes them a fortiori and independently patentable overt these references.

The Rejection of Independent Claim 18 on Jarrell et al. (U.S. 5,306,910) in View of Labowsky et al. (U.S. 4,531,056) due to Obvious Is Overcome

Claim 18 has been rewritten to define patentably over these references, and any combination thereof. Applicants request reconsideration of this rejection, as now applicable to currently amended claim 18, for the same reasons as above for claim 1.

Amended Dependent Claims 19-26 are A Fortiori Patentable Over Jarrell et al. in View of Labowsky et al.

Amended dependent claims 19-26 incorporate all the subject matter of amended independent claim 18 which makes them a fortiori and independently patentable overt these references.

The Rejection of Dependent Claim 2 on Jarrell et al. (U.S. 5,306,910) in View of Labowsky et al. (U.S. 4,531,056) and further in View of Kato et al. (U.S. 5,581,081) due to Obvious Is Overcome

Claim 2 has been rewritten as currently amended dependent claim 2 to define patentably over these references, and any combination thereof. Applicants request reconsideration of this rejection, as now applicable to currently amended claim 2, for the following reason:

- The targets of Jarrell et al. [as noted above] and Kato et al. are both in a **lower pressure region** while the Applicants' target is in a region at atmospheric pressure adjacent to the high transmission surface at **atmospheric pressure**, therefore being distinct from Jarrell et al. and Kato et al.

Jarrell et al. in View of Labowsky et al. and Further in View of Kato et al. Do Contain Justification To Support Their Combination To Persons Having Ordinary Skills In The Art

With regard to the proposed combination of Jerrerll et al., Labowsky et al. and Kato et al., the Applicants agree with The Examiner's proposal that doing so "would have been to selectively sample and ionize a desired diameter of droplets", creating an ion source.

As describe above in in claim 1, the use of a high transmission surface as described by the Applicants in dependent claim 2 is not to maximize the generation of ions, but to separate the regions of gas-phase ions production from ion focusing. Producing ions distal to the high transmission surface, attract the ions to the surface, passage of the ions through the plurality of openings in the surface, and once through the openings to focus the ions onto a target or into an aperture—all at atmospheric pressure.

Applicants therefore submits that combining Jarrell et al. and Labowsky et al. is justified but while both apparatus's are for **gas-phase ion production,** the Applicants apparatus is for the **separation** of the regions of **ion production** from the subsequent **focusing** of the ions utilizing a perforated high transmission surface and for the transfer of substantially all the ions from the ion source into a focusing region.

The Rejection of Dependent Claims 9, 16, and 24 on Jarrell et al. (U.S. 5,306,910) in View of Labowsky et al. (U.S. 4,531,056) and further in View of Moni et al. (U.S. 6,465,766 B1) due to Obvious Is Overcome

Amended Claims 9, 16 and 24 incorporate all the subject matter of independent claims 1, 13, and 18 which makes them a fortiori and independently patentable over these references.

Claim 9 along with its independent claim 1 cites the use of a high transmission surface interposed between multiple ion sources and a target. This is entirely foreign to Jarrell et al., in view of Labowsky et al., and further in view of Moni et al. to use a **perforated surface** with an **electrostatic potential difference across the surface**, with the downstream side (underside) of the surface being greater than the upstream side (topside) of the surface, to sample multiple ion sources and transfer substantially all the ions from these multiple sources onto a target surface or into a target aperture.

In a similar manner, claim 16 with its independent claim 13; and claim 24 with its independent claim 18 is distinct over the combination of Jarrell et al., Labowsky et al., and Moni et al.

Accordingly Applicants submit that the dependent claims are fortiori patentable and should be allowed.

Conclusions

For all of the reasons given above, applicants submit new drawings (Figures 1A, 1B, 1C and 2A) that comply with 37 CFR 1.83(a) showing the feature **voltage supply** that is specified in the claims; **informalities** in the claims have been removed and that the claims comply with section 112, **removing objections to being indefinite**, and are now in proper form, the claims define over prior art under Section 102 because:

the prior art along with Jarrell et al., Labowsky et al., Moini et al., and Kato et al. do not show a perforated **high transmission surface** isolating the regions of atmospheric or near atmospheric pressure ion generation from a ion focusing region at atmospheric pressure, transferring the ions across the perforated surface by providing a **large electrostatic potential difference** across the surface, with the **downstream side (underside) of the surface being greater than the upstream side (topside) of the surface**, whereby substantially all the ions from the source are transferred into the focusing region, and

the claimed distinctions are of patentable merit under Section 103 because of the new results of

using a perforated high transmission surface with a large electrostatic potential across the surface results in the unexpected ability to pass substantially all the gas-phase ions through the openings in the perforated surface and the unappreciated advantage of focusing ions at atmospheric pressure with a **perforated structure with a larger electrostatic potential across the surface that experts in the field of atmospheric ionization and sampling have not explored or conceived**.

Accordingly, applicants submits that this application is now in full condition for allowance, which action they respectfully solicit.

Conditional Request for Constructive Assistance

Applicants have amended the claims of this application so that they are proper, definite, and define novel structure, which is also unobvious. If, for any reason this application is not believed to be in full condition for allowance, applicants respectfully request the constructive assistance and suggestions of The Examiner pursuant to M.P.E.P. § 2173.02 and. § 707.07(j) in order that the undersigned can place this application in allowable condition as soon as possible and without the need for further proceedings.

Very Respectfully,

Edward W Sheehan

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----------Applicants Pro Se----------

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Inventor's Signature: _____

Edward W Sheehan, Applicant

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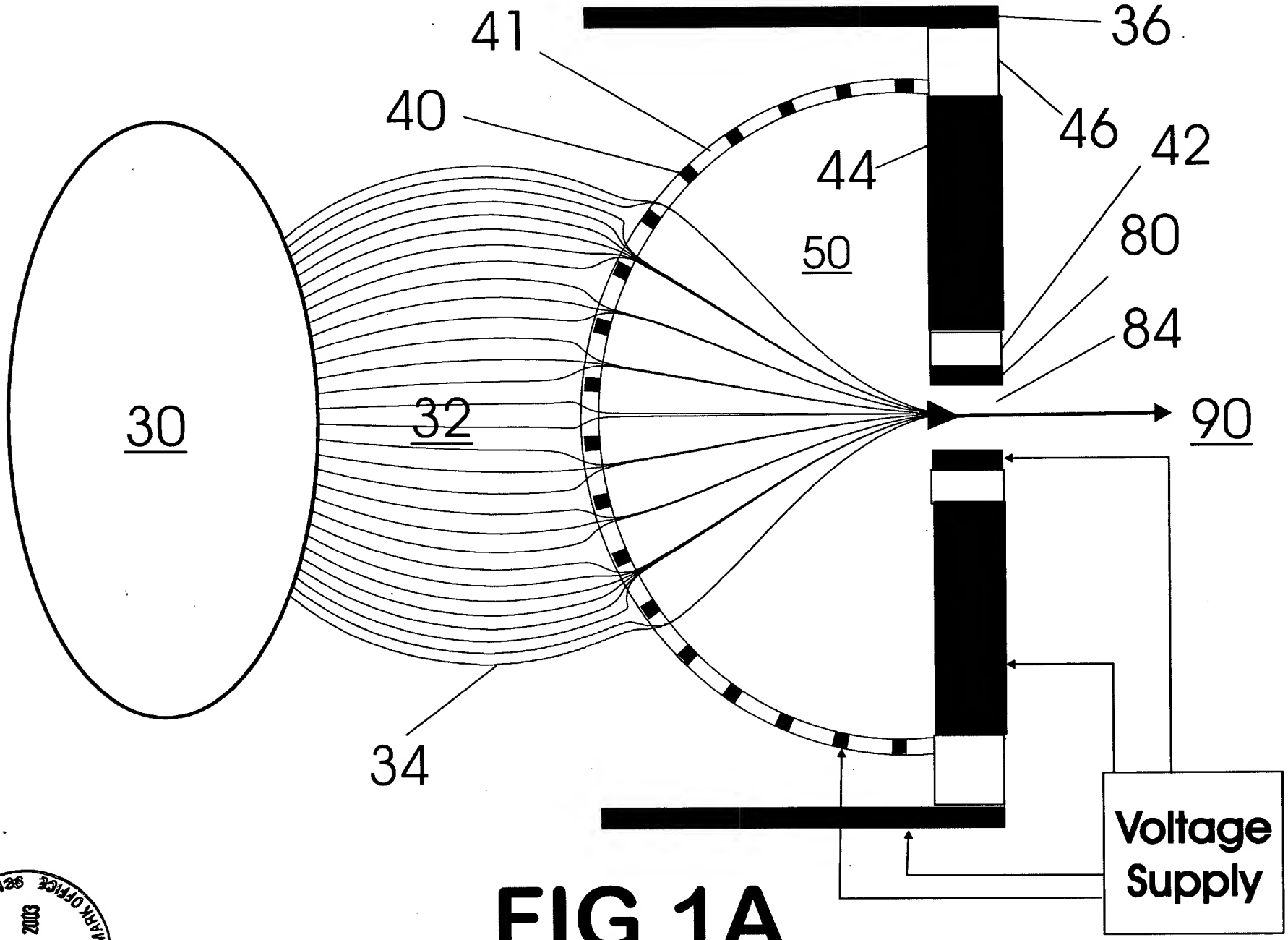

FIG 1A

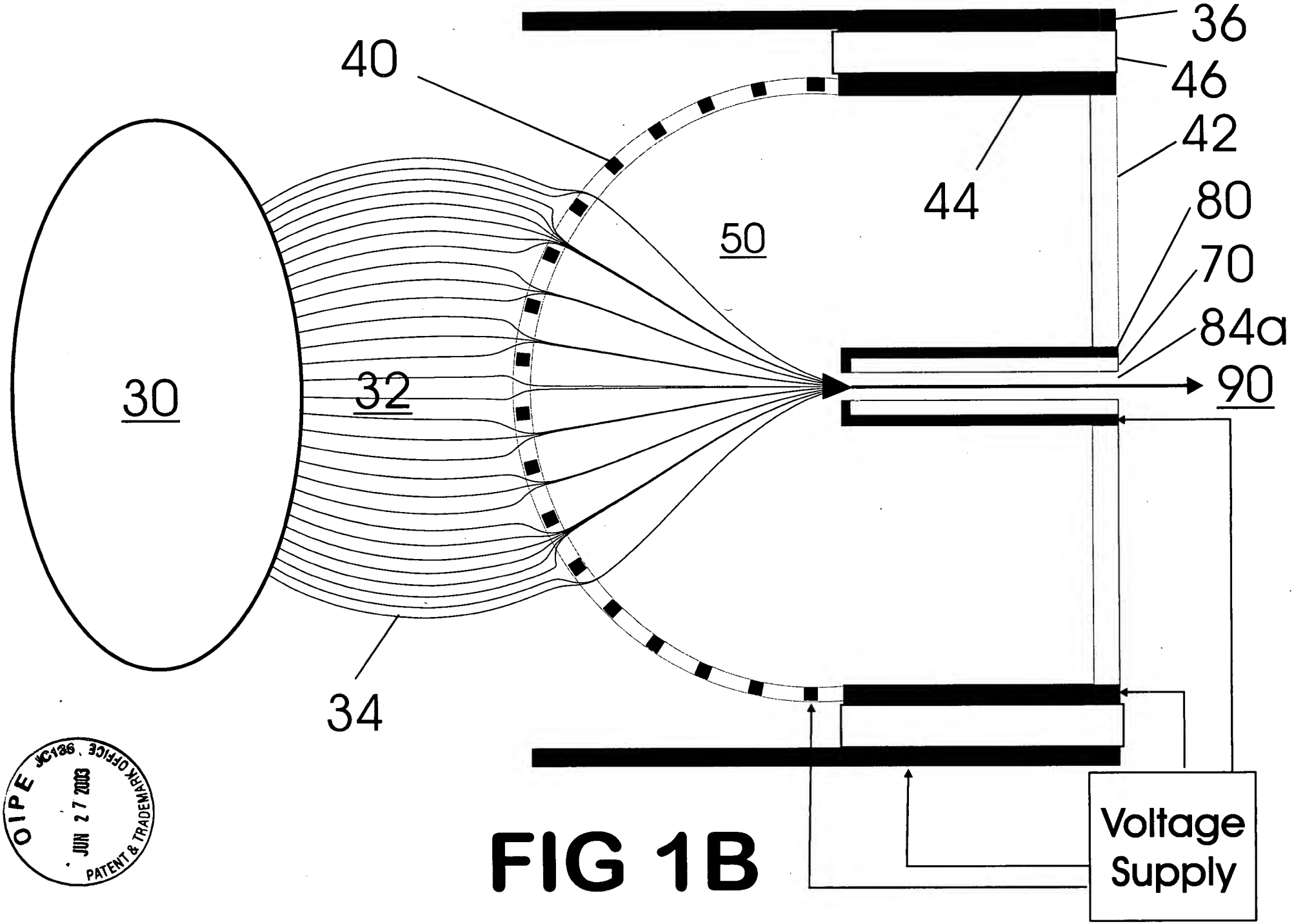

FIG 1B

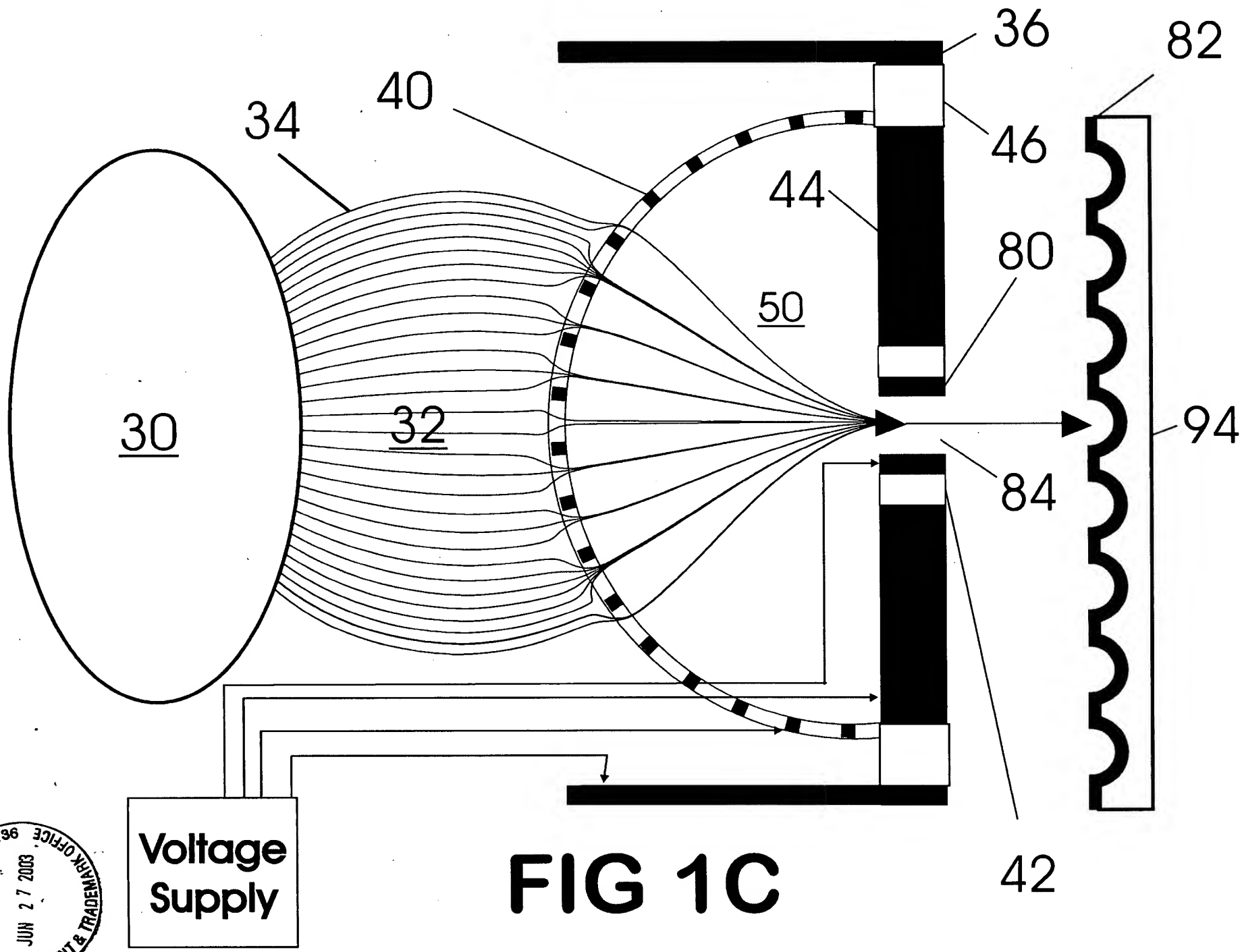

FIG 1C

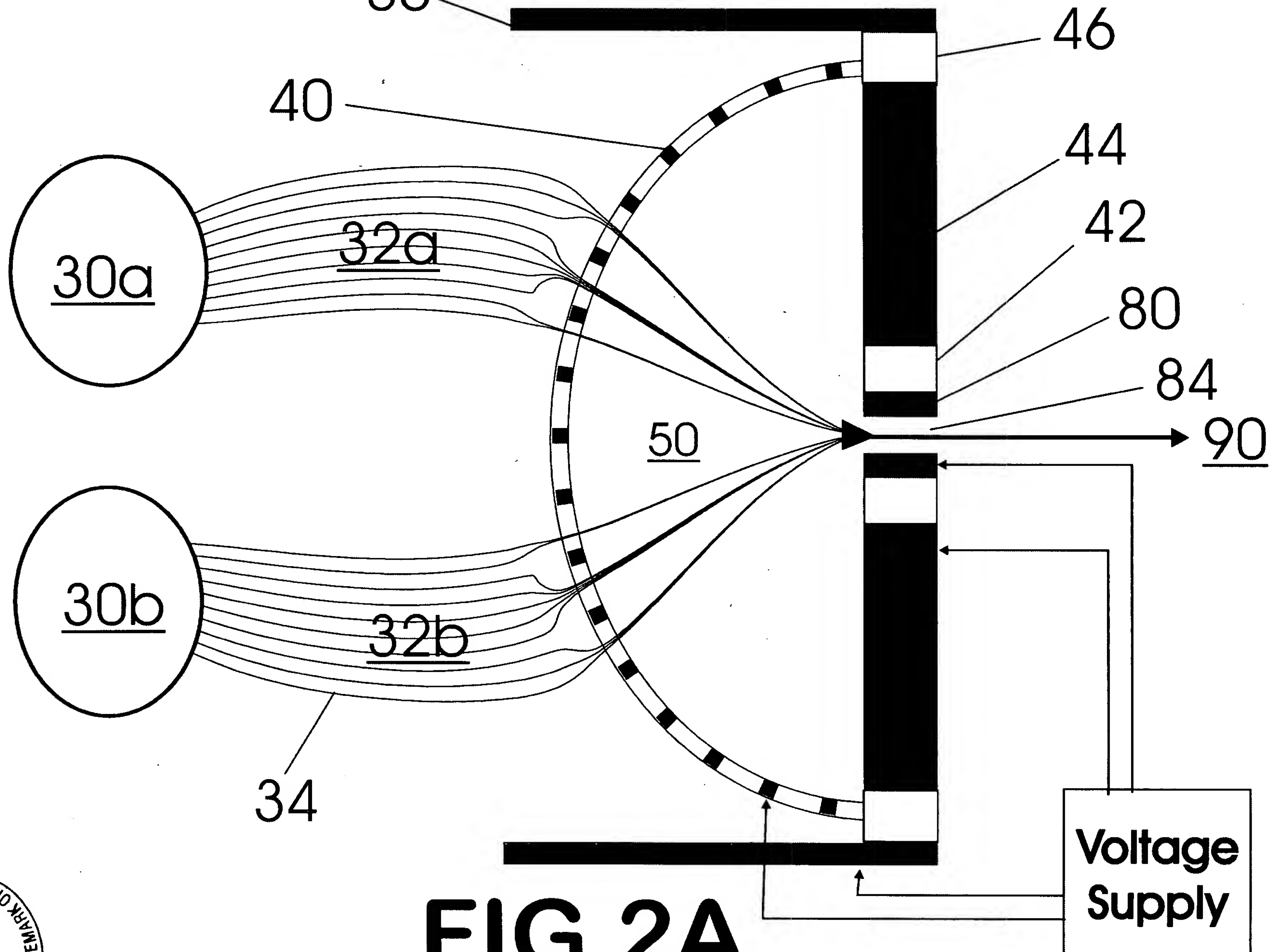

FIG 2A